KALSEKAR TECHNICAL CAMPUS

INNOVATIVE TEACHING   EXUBERANT LEARNING

Knowledge Resource & Relay Centre (KRRC)

AIKTC/KRRC/SoET/ACKN/QUES/2022-23/   Date: 25/01/23

School: **SoET-REV. C-SCHEME**   Branch: **CIVIL ENGG.**   SEM: **V**

To,

Exam Controller,

AIKTC, New Panvel.

Dear Sir/Madam,

Received with thanks the following **Semester/Unit Test-I/Unit Test-II (Reg./ATKT)** question

papers from your exam cell:

Sr. No.	Subject Name	Subject Code	Format SC	Format HC	No. of Copies
1	Theory of Reinforced Concrete structures	CE-C501		✓	
2	Applied Hydraulics	CE-C502		✓	
3	Geotechnical Engineering-I	CE-C503		✓	
4	Transportation Engineering	CE-C504		✓	
5	Department Optional Course – 1 Advanced Concrete Technology	CE-C505		✓	
6	Department Optional Course – 1 Building Services & Repairs	CE-C505		✓	

Note: SC – Softcopy, HC - Hardcopy

(Shaheen Ansari)

Librarian, AIKTC

2:30pm Sem-V-CBCS-Reg. R-19

CE
24/11/22

Time: 3-hour   **Max. Marks: 80**

Please Note:

1. All questions carry **equal** marks
2. Question **one** is **compulsory**
3. Attempt any **three** out of remaining questions
4. Use of **IS codes** is permitted
5. **Assume** suitable data if required and **state** if clearly.

Q1		Attempt any **4 out of 6 questions**. Each question carry 5 marks.	20
	a)	What are the assumptions in working stress method. Draw the stress strain diagram for the singly reinforced beam in working stress method.	
	b)	Explain characteristic strength of material, characteristic load, and partial safety factors.	
	c)	Explain the condition when the beam shall be designed as a doubly reinforced beam.	
	d)	Differentiate one way slab and two way slab.	
	e)	Explain Pu – Mu Interaction Curve.	
	f)	Explain different types of footing with neat sketch.	

Q2	a)	A simply supported beam of width 250 mm and overall depth 550 mm is reinforced with 4 bars of 16 mm diameter on tension side. Clear cover to steel is 25mm. Find the safe UDL it can carry in addition to its self-weight on a span of 4m. Use M20 grade of concrete and Fe 415 steel. Adopt Working Stress Method.	08
	b)	A reinforced concrete beam 250mmX600 mm overall depth reinforced with 5 bars of 16mm diameter is used as a simply supported beam over an effective span of 6m. Determine the maximum UDL the beam can carry safely including self-weight. Use M20 concrete and Fe 415 steel. Adopt Limit State Method.	08
	c)	Explain Limit State of Collapse and Limit State of Serviceability	04

Q3	a)	A doubly reinforced rectangular beam 250mmx 600mm overall depth is reinforced with 3 bars of 16 mm diameter in compression and 4 bars of 20 mm diameter in tension side. Determine the moment of resistance of the section. Use M20 grade concrete & Fe 415 grade of steel. Adopt Working Stress Method	10
	b)	Find out the ultimate moment of resistance of a flanged section with flange width = 1050mm, depth of flange = 120mm Area of steel = 5 nos of 20mm diameter Effective depth = 600mm Width of rib = 280mm	07
	c)	What are the advantages of T beams over rectangular beams.	03

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Q4 a) Design shear reinforcement for a beam of 280mmX 450mm effective   10
        depth carrying a factored load of 30kN/m over a span of 6m. It is
        reinforced with 1256mm² steel. Use M20grade of concrete and Fe 415
        steel. Adopt Limit State Method.

    b) Design a slab for a hall of size 7m X 3m clear span. The slab is simply   10
        supported on 230mm wall on all the four sides. Consider live load as
        4kN/m² and floor finish as 1kN/m². Assume M20 grade of concrete and
        Fe 415 steel. Draw Reinforcement details. Adopt Limit State Method.

Q5 a) Design a short circular column with helical reinforcement to carry an   10
        ultimate load of 2100kN. Use M20grade of concrete and Fe 415 steel.
        Draw Reinforcement details. Adopt Limit State Method

    b) Explain the need of transverse reinforcement in columns. How can you   5
        differentiate short column and long column.

    c) Write a note on one way shear and two way shear in footing.   5

Q6 a) Design a short square column to carry an ultimate load of 1800kN. The   08
        column is 4m long effectively held in position but not restrained against
        rotation. Use M20 grade of concrete and Fe 415 steel. Draw
        Reinforcement details. Adopt Limit State Method

    b) Design a square footing for a short axially loaded column of size   12
        350mmX350mm, carrying working load of 700kN. Use M20 grade of
        concrete and Fe 415 steel. Safe bearing capacity of soil is 180kN/m².
        Draw reinforcement details. Adopt Limit State Method

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Sem – V · CBCS – Reg.

Civil
24/11/2022
2:30 pm

(3 Hours)   Total Marks 80

Note :- 1. Q.No.1 is compulsory.
   2. Attempt any three questions out of remaining five questions.
   3. Assume any data if required stating clearly

Q.No.1   Solve any four questions out of following   **20**
   (a) What is Impulse momentum principle. Show that the force exerted by the   **[5]**
   jet on a stationary vertical plate in the direction of jet is $\rho a V^2$
   (b) Draw the neat sketch of layout of hydroelectric power plant.   **[5]**
   (c) Define various efficiencies of Centrifugal Pump.   **[5]**
   (d) Differentiate between (i) Uniform flow and Non Uniform flow (ii)   **[5]**
   Steady flow and Unsteady flow (iii) Sub critical, critical and super critical
   flow.
   (e) Explain briefly Specific Energy Curve   **[5]**

Q.No.2   (a) A jet of water of 30 mm diameter strikes a hinged square plate at its   **[10]**
   centre with a velocity of 20 m/s. The plate is deflected through an angle of
   20^0. Find the weight of plate. If the plate is not allowed to swing, what will
   be the force at the lower edge of the plate to keep plate in vertical position.
   (b) Derive the expression for force exerted by a jet on stationary curved   **[10]**
   plate, when the jet strikes the curved plate at the centre.

Q.No.3   (a) A Pelton wheel is to be designed for the head of 58 mt when running at   **[10]**
   190 r.p.m.. The Pelton wheel develops 95 kW shaft power. The velocity of
   the buckets is equal to 0.5 times the velocity of the jet. Overall efficiency is
   85%. Take $C_v = 0.97$
   (b) A Kaplan turbine develops 24000 kW power at an average head of 40   **[10]**
   meters. Assuming a speed ratio of 2, flow ratio of 0.6, diameter of boss equal
   to 0.32 times the diameter of runner and overall efficiency of 90%. Calculate
   the diameter, speed of the turbine

Q.No.4   (a) A centrifugal pump having outer diameter equal to two times inner   **[10]**
   diameter and running at 1000 r.p.m.. Pumps works against a total head of 40
   meter. The velocity of flow through the impeller is constant and equal to 2.4
   m/s. The vanes are set back at an angle of 40^0 at outlet. If the outer diameter
   of the impeller is 500 mm and width at outlet is 50 mm, determine (i) Vane
   angle at inlet (ii) Work done by impeller on water per second (iii)
   manometric efficiency

   (b) Explain briefly multistage centrifugal pump   **[05]**
   (c) Explain Hydraulic Press   **[05]**

Q.No.5 (a) Derive the conditions for most economical trapezoidal channel section. [10]
        (b) Determine the diameter of circular sewer pipe which is laid at a slope of [10]
        1 in 8100 and carries a discharge of 0.8 m^3/sec when flowing half full. Take
        Manning's N as 0.020

Q.No.6. (a) Derive the expression for Gradually Varied Flow. [10]
         (b) Explain various type of bed slope in open channel. [5]
         (c) The discharge of water through a rectangular channel of width 6 mt is 12 [5]
         m^3/sec when depth of flow is 1.0 mt, Calculate : (i) Specific Energy (ii)
         Critical Depth and Critical velocity.

R-19

Sem—I—CBCS— Reg.

CE
28/4/22

Time: 3 Hours   Max Marks: 80

Note 1. Question 1 is compulsory
2. Attempt any **4** out of six questions
3. Assume any suitable data where ever required

Q.1   Attempt any **four**

a.   A saturated sample of undisturbed clay has a volume of 19.2cc and weight as 32.5gm.   05
After oven drying the soil sample, the weight reduces to 20.2gm. Determine saturated
unit weight of the clay sample. Draw a phase diagram.

b.   Explain a method of determining the gran size distribution of cohesionless soils.   05

c.   Calculate the value of permeability of a sample of 6cm height and 50cm2 cross-   05
sectional area, if a quantity of water of 430cc flows down in 10min under an effective
constant head of 40cm. On oven drying the test specimen weighed 498gm. Assuming
$G = 2.65$, calculate the seepage velocity of water during the test.

d.   A sample of clay has a void ratio of 0.70 in the undisturbed state and of 0.50 in a   05
remoulded state. If the specific gravity of solids is 2.65, determine shrinkage limit in
each case.

e.   Compute the area ratio of a sampling tube given the outside diameter = 100mm and   05
inside diameter =94mm. In what types of soil can this tube be used for sampling.

Q.2   a.   Explain factors affecting compaction   05
b.   Write a note on methods of boring.   05
c.   The following are the results of standard compaction test performed on a sample of   10
soil:

Water content, %	5	10	14	20	25
Bulk density, gm/cc	1.77	1.98	2.1	2.18	2.16

Plot compaction curve and obtain maximum dry density and optimum moisture
content. Calculate the water content necessary to completely saturate the sample at its
maximum density, assuming no change in the volume. Take $G = 2.7$.

Q.3   a.   What are different types of soil structures which can occur in nature? Describe in brief.   05
b.   How would you determine the average permeability of a soil deposit consisting of   05
number of layers. Discuss in detail with neat diagram.
c.   The water table in a certain deposit of soil is at a depth of 2m below the ground surface.   10
The soil strata consist of clay up to a depth of 4m from the ground surface and below
which lies sand. The clay stratum is saturated above the water table. Given Clay
stratum: $w = 30\%$, $G = 2.72$; Sandy stratum: $w = 26\%$, $G = 2.64$. Determine and
construct pressure distribution diagram of total pressure, pore water pressure and
effective pressure at a depth of 8m below the ground surface. Also determine change
in the effective pressure if the water table is brought down to a level of 4m below the
ground surface by pumping.

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Q.4 a. What are the various factors that affect coefficient of permeability? Discuss.   05

b. The minimum and maximum dry density of a sand were found to be 1.50 and   05
1.70gm/cc. Calculate the dry density corresponding to relative densities of 50% and
75%.

c. A pumping test was carried out in an unconfined aquifer out to determine the   10
coefficient of permeability of soil at a site which was selected for the construction of
an earth dam. The observation wells were established at distance of 3 and 6 m from
the test well. The following data were obtained.
Depth of water table = 16m, discharge under steady condition = 2.3m3/min, draw
down at outer well = 0.5m, draw down at inner well =1.5m. Draw a neat diagram and
determine the coefficient of permeability of the soil.

Q.5 a. Define Seepage and Discharge velocity. Determine the coefficient of permeability (in   10
m/day) of a soil sample 6cm in diameter and 15cm in height. The diameter of stand
pipe is 2cm. The test results show head of water before the start of test as 45cm and
final head after 2minutes of commencement of test as 30cm.

b. A sand deposit consists of two layers. The top layer is 2.5m thick with bulk density   10
1.71 gm/cc and the bottom layer is 3.5m thick with saturated density 2.06 gm/cc. The
water table is 3.5m from the surface and the zone of capillary saturation is 1m above
the water table. Draw the diagram showing the variation of total stress, neutral stress
and effective stress.

Q.6 a. What are the purposes of site investigation. A sample of clay has liquid limit of 62%   10
and plasticity index 32%. (a) What is the state of consistency of the soil if the soil has
its natural water content of 34%. (b) Calculate the shrinkage limit if the void ratio of
the sample at the shrinkage limit is 0.70. Assume G = 2.70

b. An air-dried soil sample weighing 25 kg was sieved in a laboratory. The results are   10
given below.

IS sieve size	2.0	1.0	600µ	425µ	212µ	150µ	75µ	Pan
Mass retained, gm	0	2020	3510	7530	8150	2810	900	80

Draw the grain size distribution curve and determine coefficient of curvature and
coefficient of uniformity.

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RM
30/11/22

CE R-19

Sem—I — CBCS — Reg.

(3 Hours) [Total Marks: 80

Note: i. Q. No. 1 is **compulsory**
ii. Attempt **any 3** out of remaining 5
iii. Support all **theory and numerical** with neat sketch

1.   **Solve any four**   (20 M)
   A.   Compare various modes of transportation on basis of operating speed, initial cost, operating cost and suitability.
   B.   Explain the classification of highways.
   C.   Discuss on O&D study.
   D.   Compare rigid and flexible pavement on basis of material used, flexural strength, suitability and cross section.
   E.   Write note on use of Geosynthetics in highways.
   F.   Explain rigid pavement failures.

2.   A.   Enlist factors affecting safe stopping distance. Also, on a highway, due to fog, only 20 meters of road was visible. Find the speed to be permitted for the vehicles to avoid accidents if reaction time is 2 sec and f=0.13.   (08 M)
   B.   Discuss on Structural and Functional evaluation of pavements along with the list of equipment's used.   (06 M)
   C.   Explain conflict points and its types. Also enlist measures to reduce conflict points on roads.   (06 M)

3.   A.   i.   Explain the function of sleepers.   (08 M)
          ii.   What is equilibrium Cant value of 2^0 curve on a B.G track if 15, 10, 5 and 2 trains are running at 50, 60, 70 and 80 kmph respectively.
   B.   Explain the concept of PCU and also discuss the factors affecting PCU.   (06 M)
   C.   What is Vehicle damage factor? Also find msa for construction of new two-lane bypass having initial traffic 400 cvpd in both directions. Rate of growth is 7.5 %, VDF is 2.5, CBR is 4 %, construction period is 2 years & 'n' is 15 years.   (06 M)

4.   A.   Design a rigid pavement for wheel load of 7000 kg, tyre pressure 7.5 kg/cm², spacing between longitudinal joints is 3.75 m & spacing between contraction joints is 4.2 m. Take $E = 3 \times 10^5$ kg/cm², $\mu = 0.15$, $e = 1 \times 10^{-5}$, $k = 30$ kg/cm³, flexural strength = 45 kg/cm². Assume Cx = Cy = 1.1   (08 M)

Thickness (cm)	22	24	26	30
Temp. Difference	14.8	15.6	16.2	16.8

   FOS = 1.1 to 1.2.
   B.   If the ruling gradient on a stretch of road is 6 % & radius of curve is 60 m, find the grade compensation to be given & the compensated gradient.   (06 M)
   C.   Discuss procedure of construction of flexible pavement.   (06 M)

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5. A. Enlist desirable properties of pavement materials and discuss any 1 test on aggregate in detail. (08

    B. Draw a layout of an airport with all its components and also find the increase in runway length if the airport is shifted from a location of 150 meters R.L to 400 meters R.L. (06 M.

    C. Compare different types of road signs and draw 3 examples of each. (06 M)

6. A. Find Median & Modal Speed for the following data. Also determine the design speed, upper limit & lower limit speed for the following: (08 M)

Speed Range	Frequency (qi)	Speed Range	Frequency (qi)
0-5	0	25-30	21
5-10	3	30-35	16
10-15	8	35-40	12
15-20	13	40-45	5
20-25	19	45-50	0

    B. The radius of curve is 100 m & design speed is 50 kmph. Assume f = 0.15. Calculate superelevation, if full friction is assumed. Also find 'f' if no superelevation is provided. (06 M)

    C. Deflection values are found on summer mid-day having test temperature as 42°C. find characteristic deflection for the following data. Also apply the corrections. Assume moisture correction factor as 1.1. (06 M)

Initial	Intermediate	Final	D (mm)
0	37	39	1.22
8	42	43	1.30
0	46	49	1.19

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.30 pm   Sam–V–CBCS–Reg   CE (R-19)   2/12/22

(3HOURS)   [Total Marks 80]

PLEASE NOTE:
1. **Question no 1 is compulsory.**
2. Attempt **any three questions** out of remaining question.
3. Figures to the right indicate full marks.
4. Illustrate answer with proper sketches.

Q1		Attempt any **four of the following**	20
	a)	Explain the working principle of lifts	
	b)	Write a note on Water meter.	
	c)	What is a Three-Phase Power and Its Features?	
	d)	Explain Rapid Chloride Penetration Test (RCPT).	
	e)	What is Polymer modified mortar? Explain its application in repair.	
	f)	What are the safety measure to be taken on the construction sites?	
Q2	a)	Explain in detail HVAC system with its working principle, types and applications	10
	b)	Explain in detail Earthing with its working principle, types and applications.	10
Q3	a)	Explain with neat sketches: **i)** Septic Tank **ii)** Column jacketing	10
	b)	Explain in detail causes of deterioration of concrete.	10
Q4	a)	Write a note on: **i)** Moisture barrier systems **ii)** Manhole	10
	b)	Explain in detail temporary support structures with respect to their types and applications.	10
Q5		Attempt **any four** of the following	20
	a)	Differentiate between Lifts and Elevators.	
	b)	Explain in detail types of wires.	
	c)	Explain in detail types of pipes	
	d)	What is grouting? Write its application in repair.	
	e)	Write a note on UPV Test	
Q6	a)	Explain the procedure to conduct condition survey of a building.	5
	b)	Explain in detail Tendering process for construction projects.	5
	c)	What are the measures to protect reinforcement from corrosion?	5
	d)	Define visual task and explain factors affecting visual task	5

*************END***********

12536

1T00635   T.E.(Civil Engineering)(SEM-VI)(Choice Base Credit Grading System   R-20-21)(C Scheme)   31826   Department Optional Course-I Building Services & Repairs

Correction in Q.P Code 12536

Corrected words are marked with Bold

3a) Differentiate between Lifts and Escalators

5c) Explain in detail types of pipe material

Received

तारीख
02/12/น (S S)
(P.P.sawds)
5:14 pm.

Time: 3Hrs   Max. Marks: 80

N.B.:   (1) Question No.1 is compulsory
         (2) Attempt any three from the remaining
         (3) Draw neat sketches wherever essential
         (4) Write answers in legible handwriting
         (5) Assume suitable data if required

Q.1.   **Solve any four out of five**   **5 Marks Each**

A   Explain importance of water/cement ratio of concrete.

B   What is workability of concrete? Explain any four factors affecting
     workability.
C   Explain light weight concrete.
D   List out laboratory tests of cement. Explain any one of them.
E   Why curing is required for fresh concrete? List out various methods of
     curing.

Q.2.   **Solve any four out of six**   **5 Marks Each**

A   Explain Vacuum concrete.

B   Explain what sea water attack on concrete is.

C   What is Fiber Reinforcement concrete? List out any 4 types of fibers used in
     concrete.
D   What is self-compacted concrete? Explain advantages of SCC.

E   What are advantages of FRC?

F   Write short note on ACI Method of Concrete Mix Design.

Q.3.A   **Solve any two out of three**   **10 Marks Each**

1   Explain step wise procedure of Concrete Mix Design by IS 10262 Method.

2   Write note on Types their uses of cement. (any 6)

3   Explain difference between Nominal Mix & Design Mix.

Q.3.B   **Solve any two out of three**   **10 Marks Each**

1   What is durability? Explain factors affecting on durability of concrete.

2   Explain difference between Accelerators and Retarders.

3   Explain Difference between Grouting admixtures and Bonding Admixtures.

Q.4.   **Solve any four out of six**   **5 Marks Each**

A   What is NDT of concrete? What are the various methods of NDT?

B   Explain Windsor probe test of NDT.

C   Explain Ground penetration Radar test of NDT.

D   What is quality control of concrete?

E   Explain acceptance criteria of concrete cubes for compressive strength.

F   Explain concrete from Industrial Waste material.

Q.5.   **Solve any two out of three**   **10 Marks Each**

A   Explain Hot weather concreting and precautions taken during Hot weather concreting

B   Explain Cold weather concreting and precautions taken during Cold weather concreting

C   Design concrete mix of M25 grade by using IS 10262 -2009, following data.

    1. Type of cement - OPC
    2. Max. Nominal size of C.A. -20 mm (Angular)
    3. Min. Cement content- 320 Kg/Cum
    4. Max. cement content - 450Kg/Cum
    5. Max. W/C Ratio - 0.55
    6. Workability -75 mm slump. & 0.8 C.F.
    7. Exposure condition - Mild
    8. Admixture - Not recommended
    9. Sp. Gravity of cement - 3.15
    10. Sp. Gravity of C.A. - 2.68
    11. Sp. Gravity of F.A. - 2.70
    12. Fine aggregates confirming from Zone -I (IS :383)
    13. Standard Deviation for M- 25 is 4.0
    14. Ratio of fine aggregate to total aggregates is 0.40

Q. 6.   **Solve any two out of three**   **10 Marks Each**

A   Explain procedure and importance to determine soundness of cement. Draw neat and labeled sketches of apparatus used to measure soundness.

B   Explain zones of fine aggregate and their importance in mix design. Write a note on gradation of aggregate with relevant curves

C   Write a note on high performance concrete w r t requirements, characteristics, merits etc.

Table 2 Maximum Water Content per Cubic Metre of Concrete for Nominal Maximum Size of Aggregate
(Clauses 4.2, A-5 and B-5)

Sl No.	Nominal Maximum Size of Aggregate mm	Maximum Water Content [1] kg
(1)	(2)	(3)
i)	10	208
ii)	20	186
iii)	40	165

NOTE — These quantities of mixing water are for use in computing cementitious material contents for trial batches.

[1] Water content corresponding to saturated surface dry aggregate.